Erysipelas of the thigh and the gluteal region: retrospective multicenter analysis of a very rare entity in 39 patients

Glatz, Martin ; Degen, Daniela ; French, Lars E ; Aberer, Werner ; Müllegger, Robert R

Abstract: BACKGROUND: Erysipelas of the thigh and the gluteal region are rarely described and not well characterized. Therefore we aim to describe the prevalence, clinical characteristics, and risk factors of these erysipelas types. METHODS: The files of 1,423 patients with erysipelas were analyzed. Data from patients with erysipelas of the thigh or the gluteal region were compared between the two groups and with a control group with erysipelas of the lower leg. RESULTS: The thigh was exclusively affected in 2.1%, and the gluteal region in 0.6% of erysipelas patients. Gluteal erysipelas had conspicuous irregular borders and sometimes appeared bilaterally. Major risk factors for erysipelas of both sites were previous surgical interventions. Gluteal erysipelas was common in patients with the metabolic syndrome and required a more intense antibiotic therapy. CONCLUSION: Erysipelas of the thigh and the gluteal region are rare and significantly associated with prior surgical disruption of lymphatic vessels.

DOI: https://doi.org/10.1159/000345619

Original Paper

Dermatology

Dermatology 2012;225:277–283
DOI: 10.1159/000345619

Received: September 30, 2012
Accepted after revision: November 5, 2012
Published online: December 19, 2012

Erysipelas of the Thigh and the Gluteal Region: Retrospective Multicenter Analysis of a Very Rare Entity in 39 Patients

Martin Glatz[a] Daniela Degen[b] Lars E. French[a] Werner Aberer[c]
Robert R. Müllegger[b]

[a]Department of Dermatology, University Hospital Zurich, Zurich, Switzerland; [b]Department of Dermatology, State Hospital Wiener Neustadt, Wiener Neustadt, and [c]Department of Dermatology, Medical University of Graz, Graz, Austria

Key Words
Erysipelas · Gluteal region · Thigh · Metabolic syndrome

Abstract
Background: Erysipelas of the thigh and the gluteal region are rarely described and not well characterized. Therefore we aim to describe the prevalence, clinical characteristics, and risk factors of these erysipelas types. ***Methods:*** The files of 1,423 patients with erysipelas were analyzed. Data from patients with erysipelas of the thigh or the gluteal region were compared between the two groups and with a control group with erysipelas of the lower leg. ***Results:*** The thigh was exclusively affected in 2.1%, and the gluteal region in 0.6% of erysipelas patients. Gluteal erysipelas had conspicuous irregular borders and sometimes appeared bilaterally. Major risk factors for erysipelas of both sites were previous surgical interventions. Gluteal erysipelas was common in patients with the metabolic syndrome and required a more intense antibiotic therapy. ***Conclusion:*** Erysipelas of the thigh and the gluteal region are rare and significantly associated with prior surgical disruption of lymphatic vessels.

Introduction

Erysipelas is a frequent, acute bacterial infection of the dermis and hypodermis [1, 2]. It represents a painful, erythematous, expanding plaque, occasionally with hemorrhages, bullae and necrosis [3, 4]. Extracutaneous symptoms are frequent and comprise regional lymphadenopathy, malaise, fever and chills [5]. Diagnosis is primarily based on the clinical picture and substantiated by elevated C-reactive protein and leukocytosis. Direct detection of the etiological agent and serology are not helpful in clinical routine [3, 6, 7]. Treatment with β-lactam antibiotics is sufficient in most cases [8]. The development and course of erysipelas is associated with systemic and/or local risk factors. Systemic risk factors may be liver and kidney disease, heart failure, neoplasms, immunosuppression, diabetes, hyperuricemia, hyperlipidemia, hypertension, obesity, seated position, use of nonsteroidal anti-inflammatory drugs, smoking, and alcohol abuse [5, 9–14]. The most important local pathogenic factor is a disruption of the epidermal barrier that serves as portal of entry for bacteria, thus determining the localization of erysipelas. The predilection site of erysipelas in 80–90% of all cases is the lower leg [1, 2]. Furthermore, erysipelas occurs on the face in 2.5–19%, the arm in

KARGER

Fax +41 61 306 12 34
E-Mail karger@karger.ch
www.karger.com

1018–8665/12/2253–0277$38.00/0

Accessible online at:
www.karger.com/drm

Dr. Martin Glatz
Dermatology Branch/NCI/NIH
Bldg. 10/12N260, 10 Center Drive
Bethesda, MD 20892 (USA)
E-Mail martin.glatz@nih.gov

Color version available online

Fig. 1. Hemorrhagic erysipelas of the left gluteal region in a 61-year-old female patient. Note the violaceous hue and conspicuous irregular borders.

Color version available online

Fig. 2. Bilateral gluteal erysipelas in a 70-year-old female patient 2 years after hip arthroplasty.

2–9%, or the genital region in 0.5–2% [1, 3, 15]. Other parts of the body like the thigh and the buttocks are affected only exceptionally. Therefore, clinical features and risk factors of erysipelas in these regions are ill defined [1]. The aim of the present study was to analyze the prevalence of erysipelas of the thigh and buttocks as well as their clinical characteristics and the role of systemic and local predisposing factors in a large cohort of patients.

Methods

The files of 1,423 consecutive erysipelas patients treated in 3 dermatology centers in Austria (State Hospital Wiener Neustadt, n = 241; Medical University of Graz, n = 1,001) and Switzerland (University Hospital Zurich, n = 181) between January 2005 and December 2008 were reviewed. All 3 centers were the major dermatological hospitals within a catchment area of approximately 1,000,000 people each. None of the centers was a referral center for erysipelas, thus being representative of the population they service. Patients described in our study were seen during the clinical routine, and erysipelas was diagnosed by a dermatologist based on established clinical and laboratory criteria [3, 8, 9]. All relevant demographic, clinical and therapy-related parameters and laboratory signs of inflammation of patients with erysipelas on the thighs or buttocks were entered in a database. Particular interest was given to the identification of entry sites for bacteria, and local and systemic risk factors. Forty patients with erysipelas of the lower leg served as a control group. All controls were recruited from the same period of time and matched for the particular centers. Statistical comparison between erysipelas on the thigh or the buttocks and the control group was performed using Graph Pad Prism™ (version 5.00 for Windows, Graph Pad Software, San Diego, Calif., USA). After descriptive statistics, nominal and ordinal variables were analyzed by Fisher's exact test. Scale variables were tested for Gaussian distribution by the D'Agostino and Pearson omnibus normality test. None of the scale parameters showed a Gaussian distribution. Therefore statistical analyses were performed by the Kruskal-Wallis test with Dunnett's post hoc test; p values less than 0.05 were considered significant. All tests were two tailed.

Results

Clinical Characteristics of Patients

The topographic distribution of erysipelas in the 1,423 study patients was as follows: lower legs 73%, face 13%, arms 6.7%, trunk 2.7%, and genitalia 1.9%. Erysipelas exclusively localized on the thigh with no involvement of other parts of the leg was identified in 30 patients (2.1%) and in the gluteal region in 9 patients (0.6%) (table 1). Gluteal erysipelas often had conspicuous irregular borders and a violaceous hue (fig. 1). Bilateral manifestation was observed twice (fig. 2). Erysipelas of the thigh had the characteristic appearance of erysipelas of the lower leg, but vesicles and hemorrhages were very rare. That indicates that local complications were rarely seen in this small series of patients. Pain and inguinal lymphadenopathy were observed significantly less often in erysipelas of the thigh and gluteal region. All patients had elevated serum levels of C-reactive protein, whereas initial leukocyte counts were elevated in less than half of the patients. In particular, the majority of patients with gluteal erysipelas did not have leukocytosis. Initial antibiotic therapy was intravenously applied in an inpatient setting in standard dosages in all patients. In

Table 1. Clinical characteristics, laboratory values and therapy of patients with erysipelas of the thigh and the gluteal region

Parameter	Thigh (n = 30)	Gluteal region (n = 9)	Control group (lower leg, n = 40)
Median age, years	47 (20–84)[a]	56 (35–80)	59 (24–87)
Gender (female:male)	14:16	5:4	19:21
Median disease duration before therapy, days	2 (1–5)[b]	3.5 (1–14)	4 (1–24)
Bacterial entry site, patients	16 (53)	8 (89)	29 (72.5)
Skin inflammation/infection	4	6	4
Wound	7	1	10
Arthropod bite	5	1	0
Toe web intertrigo	0	0	15
Body side (left/right/both sides)	14/16/0	3/4/2	22/18/0
Pain, patients	6 (20)	2 (22)	26 (65)[c]
Local complications, patients	1 (3)[d]	3 (34)	11 (27.5)
Vesicles	1	2	8
Hemorrhages	0	1	3
Necrosis	0	0	2
Inguinal lymphadenopathy, patients	11 (37)	2 (22)	30 (76)[e]
Extracutaneous signs/symptoms, patients			
Fever and/or chills	30 (100)	9 (100)	40 (100)
Cephalea	1 (3)	1 (11)	0 (0)
Vertigo	0 (0)	1 (11)	0 (0)
C-reactive protein elevation			
Total number of patients	30 (100)	9 (100)	40 (100)
Median serum levels (normal upper limit 5 mg/l), mg/l	82 (10–320)	93.5 (42–240)	51 (10–370)
Leukocyte count			
Patients with leukocytosis	12 (40)	1 (11)	17 (42.5)
Median cell count (normal upper limit 11.3 $\times$ 10^3), $\times 10^3$ cells	10 (5–22)	8 (5–12.5)	8 (3.3–20.6)
Antibiotic therapy, patients			
Benzylpenicillin	12 (41)	3 (34)	17 (42.5)
Amoxicillin plus clavulanic acid	10 (33)	2 (22)	13 (32.5)
Clindamycin	4 (13)	2 (22)	8 (20)
β-Lactam plus clindamycin	4 (13)	2 (22)	2 (5)
Median duration of therapy, days	13 (4–26)	21.5 (10–24)[f]	11.5 (7–45)
Consecutive oral antibiotic therapy, patients	20 (67)	5 (56)	20 (50)
Median duration of consecutive therapy, days	7 (5–14)	9 (7–14)	5 (1–13)[g]

Medians are indicated with ranges in parentheses, patient numbers with percentages.

[a] $p = 0.03$ versus control group; [b] $p < 0.0001$ versus gluteal region and control group; [c] $p = 0.03$ versus thigh and gluteal region; [d] $p = 0.03$ versus gluteal region and control group; [e] $p = 0.03$ versus thigh and gluteal region; [f] $p = 0.04$ versus control group; [g] $p = 0.007$ versus thigh and gluteal region.

most patients a monotherapy was sufficient; 4 patients with erysipelas of the thigh and 2 patients with gluteal erysipelas received a combination therapy of a β-lactam antibiotic and clindamycin. The skin of all patients was completely or almost completely cleared by the end of the intravenous therapy, but patients with gluteal erysipelas had to be treated significantly longer (median of 3 weeks) to reach regression. Depending on the response to intravenous therapy, the same antibiotics were consecutively administered after hospital discharge to the same proportion of patients from the 3 groups, although for a significantly shorter duration in patients with erysipelas of the lower leg.

Entry Sites for Bacteria

In the majority of patients we identified preexisting skin conditions with a disruption of the skin barrier, thus serving as entry sites for bacteria into the dermis and hypodermis (table 1). They comprised inflammatory (ruptured epidermis cyst, eczema, psoriasis) or infectious

Table 2. Risk factors for the development of erysipelas of the thigh and the gluteal region

	Thigh (n = 30)	Gluteal region (n = 9)	Control group (lower leg, n = 40)
Local risk factors			
Previous episodes of erysipelas, patients	4 (13)	2 (22)	8 (20)
Previous surgical intervention, patients	13 (43)	4 (44)	1 (2.5)[a]
Systemic risk factors			
Total number of patients with systemic risk factors	19 (63)	7 (78)	32 (80)
Obesity	2 (7)[b]	4 (44)	15 (37.5)
Diabetes	2 (7)[c]	3 (34)	12 (30)
Hyperlipidemia	4 (13)	2 (22)	8 (20)
Arterial hypertension	6 (20)	2 (22)	13 (32.5)
Renal disease	2 (7)	1 (11)	7 (17.5)
Lung disease	1 (3)	1 (11)	2 (5)
Heart disease	5 (17)	0 (0)	10 (25)
Hepatic disease	3 (10)	0 (0)	1 (2.5)
Alcoholism	0 (0)	1 (11)	1 (2.5)
Smoking	4 (13)	2 (22)	5 (12.5)

Patient numbers are given with percentages in parentheses.
[a] $p < 0.001$ versus thigh and gluteal region; [b] $p = 0.007$ versus gluteal region and control group; [c] $p = 0.017$ versus gluteal region and control group.

(impetigo contagiosa, folliculitis/perifolliculitis, mycosis, herpes zoster) skin diseases, wounds, or arthropod bites.

Local Predisposing Factors

We identified 2 potential local risk factors, namely recurrence of erysipelas and surgical interventions prior to the onset of erysipelas. Since we do not have information on the patients beyond the current episode of erysipelas, it is not clear, how many of them suffered recurrences of erysipelas after antibiotic therapy. However, 1 patient with hypertension, hepatopathy and chronic lymphedema due to previous inguinal lymphadenectomy had had 5 earlier episodes of erysipelas of the thigh. Additionally, 3 patients with erysipelas of the thigh and 2 patients with gluteal erysipelas had a history of prior erysipelas between 1 and 3 years before the current episode (table 2). Thus, the recurrence rate does not seem to differ from the control group. The other local risk factors for erysipelas were previous surgical interventions within the affected region, which significantly outnumbered surgical procedures in the control group. Nine patients with erysipelas of the thigh had had inguinal lymphadenectomy because of malignant melanoma, 1 month to 5 years before the onset of erysipelas (median, 13.5 months). Other surgical interventions comprised hysterectomy (1), excision of melanoma without lymphadenectomy (1) and vein stripping (2). Four patients with gluteal erysipelas had undergone hip arthroplasty 3 months, 2 years, 8 years and 30 years earlier.

Systemic Predisposing Factors

A wide spectrum of general medical conditions supposed to be systemic predisposing risk factors for erysipelas [5, 9–14] was basically present in a similar percentage of patients in all groups (table 2). In patients with gluteal erysipelas, the metabolic syndrome was more prevalent than in those patients with erysipelas of the thigh, but not significantly different from the control group. For erysipelas of the thigh, comorbidities were more diverse with hypertension in the first place.

Discussion

In the present study erysipelas was located in the gluteal region in only 9/1,423 patients (0.6%) and on the thigh in 30 patients (2.1%). Because our study was hospital based, it is possible that the recruitment of patients could have been biased towards cases with severer erysipelas and more comorbidities. However, the health care systems in Austria and Switzerland typically allow for a direct access of patients to hospital centers without previ-

ously contacting the practice of a family physician or dermatologist, which generally ensures a mixed collective of patients in the centers. The small number of patients with erysipelas at uncommon sites we described is in line with three former retrospective studies, which collectively found 19 cases (1.2%) of gluteal manifestation in 1,639 patients with the diagnosis erysipelas [12, 16, 17]. In accordance, gluteal erysipelas has been observed as complication of hip replacement in only 14 of 2,200 patients (0.6%) after this orthopedic intervention [18]. The frequency of postsurgical gluteal erysipelas was higher (5/25; 20%) in one case series but major plastic interventions (functional gluteoplasty) for restoration of fecal continence was performed in those patients [19]. In an additional 7 patients presented in case reports [20–25] gluteal erysipelas was either associated with regional surgery or immunocompromise (e.g. IgG deficiency). Manifestation on the thigh has been described in only 12 of 244 patients (4.9%) in a retrospective African study [12] and in 2 cases by Durupt et al. [22]. It is not clear why erysipelas of the gluteal region and the thigh are so uncommon, because bacterial entry sites in these regions seem to be as common as for erysipelas of the lower leg. In this case, toe web intertrigo is the most frequent portal of entry for bacteria, which has been found in 37.5% of our control patients and in up to 66% by other authors [9, 26]. In acute and relapsing gluteal erysipelas, intertrigo of the gluteal fold has been described as important in that respect [17, 22]. In the present study, a wide variety of potential entry sites was identified, which, taken together, do not have a lower prevalence than toe web intertrigo [9, 27, 28]. Also, hip arthroplasty, a major potential predisposing factor, is performed very often, for example in more than 150,000 individuals per year in Germany [29]. Factors contributing to the low prevalence could include less pronounced stasis than in the lower legs, the different route of lymphatic vessels, a specific local microbiological milieu and peculiarities of the antimicrobial defense [30, 31]. Because of the rarity of erysipelas of the buttocks and thighs, physicians may not be alert to this diagnosis. Because erysipelas requires a specific therapy, it is important to distinguish it from differential diagnoses like panniculitis, thrombophlebitis, contact dermatitis or early herpes zoster [22].

The clinical characteristics of erysipelas of the thigh and gluteal region have not been outlined in detail so far. The morphological differences between gluteal erysipelas and erysipelas of the lower legs, as found in our study (table 1), may result from distinct routes of lymphatic vessels, less stasis compared to the lower leg, and/or mechanical pressure due to sitting. The relatively low number of lymphadenopathy in erysipelas of the gluteal region or the thigh compared to erysipelas of the lower legs [32] is in accordance with the literature on erysipelas at atypical sites [17, 22, 25]. A possible explanation may be the disruption of lymphatic vessels by earlier hip arthroplasty or elimination of lymph nodes by inguinal lymphadenectomy.

A main goal of our study was to identify local and systemic predisposing factors for erysipelas of the gluteal region and the thigh. In previous studies on about 2,000 patients with erysipelas of the lower leg, as well as in our control patients (data not shown), chronic venous insufficiency and lymphedema with 25% each were the most important predisposing conditions [5, 9, 13, 27, 33, 34]. In the gluteal region, surgical impairment of the lymphatic circulation has been proposed to be a predisposing factor for erysipelas [16, 17, 22]. Lymph stasis after disruption of lymphatic vessels causes retention of high-molecular-weight proteins within the interstitial tissue leading to fibrosis with reduced tissue drainage capacity resulting in a vicious cycle [33, 34]. This may also disturb the migration of dendritic cells [35], which could weaken the immunological response to pathogenic agents. Indeed, a postsurgical impairment of lymph circulation must be assumed in almost half of our patients of both groups, mostly due to hip arthroplasty or inguinal lymphadenectomy. Gluteal erysipelas has been described to develop at any time from 1 month [21] to decades [22] after surgical intervention, which is quite similar to our patients' series (3 months to 30 years). The time frame for erysipelas of the thigh after surgery was more uniform, with a median of 13.5 months. A wide range of systemic medical conditions has been linked to erysipelas of the lower leg, including insufficiency of internal organs, metabolic and malignant diseases, drug ingestion and smoking [5, 9–14]. For example, obesity represents an unambiguous risk factor [9, 27], whereas the role of diabetes is less clear [5, 9, 10, 27]. Only 1 study on gluteal erysipelas described concurrent systemic disorders, including hypertension, ischemic heart disease, and obesity but their pathogenetic impact has not been elucidated [16]. In our patients with gluteal erysipelas, among a wide variety of comorbidities, obesity and less so diabetes, hyperlipidemia, and smoking were the only factors that were more common than in the general population [36, 37]. Remarkably, the prevalence of heart disease was highest in the leg group, which could have contributed to pronounced stasis in this localization. In erysipelas of the thigh, arterial hypertension was the only frequent internal disease, but hyperten-

sion and other conditions were clearly underrepresented compared to erysipelas of the lower leg and the general population. This may be a contributing factor for the low frequency of erysipelas in that area. The clinical response to antibiotic therapy was generally good as in earlier studies [12, 16, 18, 22, 25], but slower in patients with gluteal erysipelas. This is reflected by a (significantly) longer duration of intravenous therapy, the longest administration of the consecutive oral antibiotic, and the frequent combination of antimicrobials (β-lactam antibiotic plus clindamycin). The recurrence rate, obtained from the patients' history in this study, is compatible with the proportion of about one third of patients reported in the literature [18, 21, 22, 24]. Thus, the recurrence rate of erysipelas of the thigh or gluteal region is similar to that of the lower leg in our control group and in former studies [38, 39]. All 6 patients with recurrences in our study had multiple local and systemic risk factors, such as regional surgery, which has also been observed by other authors [22].

In summary, erysipelas of the thigh and even more so of the gluteal region are very rare skin affections. They particularly occur at any time after surgical interventions, especially hip arthroplasty or inguinal lymphadenectomy. Not a single systemic comorbidity represents a statistically significant risk factor for erysipelas in atypical sites, although the metabolic syndrome appears to be more common in patients with gluteal erysipelas.

Disclosure Statement

All authors declare no conflict of interest.

References

1 Bonnetblanc JM, Bedane C: Erysipelas: recognition and management. Am J Clin Dermatol 2003;4:157–163.
2 Bernard P: Management of common bacterial infections of the skin. Curr Opin Infect Dis 2008;21:122–128.
3 Chartier C, Grosshans E: Erysipelas. Int J Dermatol 1990;29:459–467.
4 Goettsch WG, Bouwes Bavinck JN, Herings RM: Burden of illness of bacterial cellulitis and erysipelas of the leg in the Netherlands. J Eur Acad Dermatol Venereol 2006;20:834–839.
5 Bartholomeeusen S, Vandenbroucke J, Truyers C, Buntinx F: Epidemiology and comorbidity of erysipelas in primary care. Dermatology 2007;215:118–122.
6 Eriksson B, Jorup-Ronstrom C, Karkkonen K, Sjoblom AC, Holm SE: Erysipelas: clinical and bacteriologic spectrum and serological aspects. Clin Infect Dis 1996;23:1091–1098.
7 Linder A, Johansson L, Thulin P, Hertzen E, Morgelin M, Christensson B, Bjoerck L, Norrby-Teglund A, Akesson P: Erysipelas caused by group A streptococcus activates the contact system and induces the release of heparin-binding protein. J Invest Dermatol 2010;130:1365–1372.
8 Brennecke S, Hartmann M, Schofer H, Rasokat H, Tschachler E, Brockmeyer NH: Treatment of erysipelas in Germany and Austria – results of a survey in German and Austrian dermatological clinics. J Dtsch Dermatol Ges 2005;3:263–270.
9 Dupuy A, Benchikhi H, Roujeau JC, Bernard P, Vaillant L, Chosidow O, Sassolas B, Guillaume JC, Bastuji-Garin S: Risk factors for erysipelas of the leg (cellulitis): case-control study. BMJ 1999;318:1591–1594.
10 Smolle J, Kahofer P, Pfaffentaler E, Kerl H: Risk factors for local complications in erysipelas. Hautarzt 2000;51:14–18.
11 Mokni M, Dupuy A, Denguezli M, Dhaoui R, Bouassida S, Amri M, Fenniche S, Zeglaoui F, Doss N, Nouira R, Ben Osman-Dharhi A, Zili J, Mokhtar I, Kamoun MR, Zahaf A, Chosidow O: Risk factors for erysipelas of the leg in Tunisia: a multicenter case-control study. Dermatology 2006;212:108–112.
12 Cisse M, Keita M, Toure A, Camara A, Machet L, Lorette G: Bacterial dermohypodermitis: a retrospective single-center study of 244 cases in Guinea. Ann Dermatol Venereol 2007;134:748–751.
13 Figtree M, Konecny P, Jennings Z, Goh C, Krilis SA, Miyakis S: Risk stratification and outcome of cellulitis admitted to hospital. J Infect 2010;60:431–439.
14 Pereira de Godoy JM, Galacini Massari P, Yoshino Rosinha M, Marinelli Brandao R, Foroni Casas AL: Epidemiological data and comorbidities of 428 patients hospitalized with erysipelas. Angiology 2010;61:492–494.
15 Jorup-Ronstrom C: Epidemiological, bacteriological and complicating features of erysipelas. Scand J Infect Dis 1986;18:519–524.
16 Mainetti C, Bernard P, Saurat JH: Hip surgery skin cellulitis. Eur J Med 1992;1:52–54.
17 Studer-Sachsenberg EM, Ruffieux P, Saurat JH: Cellulitis after hip surgery: long-term follow-up of seven cases. Br J Dermatol 1997;137:133–136.
18 Rodriguez JA, Ranawat CS, Maniar RN, Umlas ME: Incisional cellulitis after total hip replacement. J Bone Joint Surg Br 1998;80:876–878.
19 Hultman CS, Zenn MR, Agarwal T, Baker CC: Restoration of fecal continence after functional gluteoplasty: long-term results, technical refinements, and donor-site morbidity. Ann Plast Surg 2006;56:65–70.
20 Shama S, Calandra GB: Atypical erysipelas caused by group G streptococci in a patient with cured Hodgkin's disease. Arch Dermatol 1982;118:934–936.
21 Perlick CB, Jensen J, Overgaard S, Soballe K: Incisional cellulitis after total hip arthroplasty – a case report. Acta Orthop Scand 2003;74:622–623.
22 Durupt F, Dalle S, Ronger S, Thomas L: Does erysipelas-like rash after hip replacement exist? Dermatology 2006;212:216–220.
23 Petiot S, Bonnin-Koang HY, Sotto A, Boudousq V, Cardon JM, Pelissier J: About two big buttocks: an erysipelas with lymphoedema after pelvis surgery. Ann Readapt Med Phys 2006;49:77–80.
24 Hofer M, Stollberger C, Finsterer J: Recurrent erysipelas in myotonic dystrophy type 1 with IgG deficiency. Eur Neurol 2007;57:236–237.
25 Bachmeyer C, Begon E, Martres P, Blum L: Relapsing erysipelas of the buttock due to *Streptococcus agalactiae* in an immunocompetent woman. Clin Exp Dermatol 2009;34:267–268.

26 Roujeau JC, Sigurgeirsson B, Korting HC, Kerl H, Paul C: Chronic dermatomycoses of the foot as risk factors for acute bacterial cellulitis of the leg: a case-control study. Dermatology 2004;209:301–307.
27 Karppelin M, Siljander T, Vuopio-Varkila J, Kere J, Huhtala H, Vuento R, Jussila T, Syrjaenen J: Factors predisposing to acute and recurrent bacterial non-necrotizing cellulitis in hospitalized patients: a prospective case-control study. Clin Microbiol Infect 2010;16:729–734.
28 Gunduz A, Turkmen S, Turedi S, Nuhoglu I, Topbas M: Tick attachment sites. Wilderness Environ Med 2008;19:4–6.
29 Schrader P, Rath T: Volume-outcome-relationship in total hip replacement – literature review and model calculation of the health care situation. Z Orthop Unfall 2007;145: 281–290.
30 Noble WC: Skin bacteriology and the role of *Staphylococcus aureus* in infection. Br J Dermatol 1998;139(suppl 53):9–12.
31 Glaser R: Research in practice: antimicrobial peptides of the skin. J Dtsch Dermatol Ges 2011;9:678–680.
32 Mahe E, Toussaint P, Lamarque D, Boutchnei S, Guiguen Y: Erysipelas in the young population of a military hospital. Ann Dermatol Venereol 1999;126:593–599.
33 Cox NH: Oedema as a risk factor for multiple episodes of cellulitis/erysipelas of the lower leg: a series with community follow-up. Br J Dermatol 2006;155:947–950.
34 Damstra RJ, van Steensel MA, Boomsma JH, Nelemans P, Veraart JC: Erysipelas as a sign of subclinical primary lymphoedema: a prospective quantitative scintigraphic study of 40 patients with unilateral erysipelas of the leg. Br J Dermatol 2008;158:1210–1215.
35 Angeli V, Randolph GJ: Inflammation, lymphatic function, and dendritic cell migration. Lymphat Res Biol 2006;4:217–228.
36 Moebus S, Hanisch JU, Neuhauser M, Aidelsburger P, Wasem J, Jockel KH: Assessing the prevalence of the metabolic syndrome according to NCEP ATP III in Germany: feasibility and quality aspects of a two step approach in 1,550 randomly selected primary health care practices. Ger Med Sci 2006; 4:Doc07.
37 Uhl A, Bachmayer S, Kobrna U: Chaos concerning smoking prevalence figures in Austria. Wien Med Wochenschr 2009;159:4–13.
38 Jorup-Ronstrom C, Britton S: Recurrent erysipelas: predisposing factors and costs of prophylaxis. Infection 1987;15:105–106.
39 Leclerc S, Teixeira A, Mahe E, Descamps V, Crickx B, Chosidow O: Recurrent erysipelas: 47 cases. Dermatology 2007;214:52–57.